WHAT IS CLAIMED IS:

1. An electrical router backplane comprising:

multiple high-speed signaling layers, each high-speed signaling layer comprising a plurality of high-speed differential trace pairs sandwiched between layers of a dielectric material, each trace having a conductive pad at each end;

a plurality of conductive planes, including a plurality of ground planes interposed respectively between the high-speed signaling layers, at least one plane having a first conductive pad with a first clearance separating that pad from the remainder of the plane, that pad in substantial alignment, viewed normal to that plane, with a corresponding differential trace conductive pad on one of the high-speed signaling layers; and

a first signaling thru-hole having a conductive liner and passing through the first conductive pad and the corresponding differential trace conductive pad, the conductive liner electrically connected to both of those pads.

2. The router backplane of claim 1, wherein the at least one plane having a conductive pad comprises a plural subset of the ground planes, each having a conductive pad in substantial alignment with the corresponding differential trace conductive pad, the thru-hole passing through the conductive pad on each of the subset of ground planes and electrically connected to each of those pads.

3. The router backplane of claim 2, wherein the plural subset of the ground planes are ground planes located depth-wise at approximately evenly-spaced intervals within the backplane.

4. The router backplane of claim 3, wherein the plural subset comprises four planes located depth-wise at approximately 20%, 35%, 65%, and 80% of the backplane material stack comprising the high-speed signaling layers and the plurality of ground planes.

5. The router backplane of claim 2, wherein those ground planes not part of the plural subset have a clearance substantially aligned with the conductive pads of the ground planes that are part of the plural subset.

6. The router backplane of claim 5, wherein the capacitive coupling between the thru-hole and the collective ground planes is greater than it would be without the ground plane conductive pads.

7. The router backplane of claim 1, further comprising:

multiple signaling thru-holes similar to the first signaling thru-hole, each such thru-hole passing through and electrically connected to a corresponding high-speed differential trace conductive pad;

at least one third conductive pad, located at one of the conductive planes and similar to the first conductive pad, corresponding to each of the multiple signaling thru-holes, each of the signaling thru-holes passing through and electrically connected to its corresponding third conductive pad.

8. The router backplane of claim 7, wherein the number, size, clearance, and thru-hole depth-wise location of the third conductive pads corresponding to each signaling thru-

hole is substantially identical for each signaling thru-hole, regardless of the high-speed signaling layer containing the differential trace connected to the thru-hole.

9. The router backplane of claim 7, further comprising:

low-speed signaling traces; and

signaling thru-holes, without corresponding conductive pads at any conductive plane, corresponding to and connected respectively to the low-speed signaling traces.

10. The router backplane of claim 1, wherein the conductive planes comprise a first power distribution plane sandwiched between layers of a dielectric material, the power distribution plane having a second conductive pad with a second clearance separating that pad from the remainder of the power distribution plane, the second pad in substantial alignment, viewed normal to the power distribution plane, with the first conductive pad, the first signaling thru-hole passing through the second conductive pad and electrically connected to the second conductive pad.

11. The router backplane of claim 10, wherein the power distribution plane is substantially thicker than the plane containing the first conductive pad, the second clearance selected greater than the first clearance.

12. The router backplane of claim 10, wherein the power distribution plane is located depth-wise at approximately the center of the backplane.

13. The router backplane of claim 12, wherein the conductive planes comprise multiple additional power distribution planes adjacent the first power distribution plane, each

having a conductive pad, similar to the second conductive pad, connected to the first thru-hole.

14. The router backplane of claim 13, wherein the dielectric material sandwiching the power distribution planes has a higher dielectric loss at high-frequency than the dielectric material sandwiching the high-speed signaling layers.

15. The router backplane of claim 1, wherein the first conductive pad and the first signaling thru-hole are both circular, the first conductive pad having a diameter approximately equal to the outer diameter of the first signaling thru-hole conductive liner plus twice the hole placement accuracy of the equipment that creates the signaling thru-hole.

16. The backplane of claim 1, each differential trace pair configured with an individual trace width of approximately 7 to 9 mils and a trace height, differential trace spacing, and trace-to-ground-plane spacing related to trace width such that the impedance of a given trace is marginally more differential than single-ended.

17. A method of tuning the impedance characteristics of a high-speed signaling trace embedded in a multi-conductive-layer circuit board, the method comprising:

routing the high-speed signaling trace across the board between upper and lower ground planes, the trace separated from the upper and lower ground planes by a dielectric material of a substantially uniform thickness along the length of the trace;

at the ends of the trace, connecting the trace respectively to first and second signaling thru-holes used to inject signals at one end of the trace and receive signals at

the other end of the trace, each thru-hole having a conductive liner that passes through respective clearances in a plurality of conductive planes, including the upper and lower ground planes;

placing a first conductive pad on a first selected one of the conductive planes, the first pad having a clearance separating that pad from the remainder of the selected conductive plane; and

passing the first signaling thru-hole through the selected conductive plane in an alignment that intersects the first conductive pad.

18. The method of claim 17, further comprising:

placing a second conductive pad on a second selected one of the conductive planes, the second pad having a clearance separating that pad from the remainder of the second selected conductive plane; and

passing the second signaling thru-hole through the second selected conductive plane in an alignment that intersects the second conductive pad.

19. The method of claim 18, further comprising:

placing additional conductive pads on additional selected conductive planes, each substantially aligned with either the first or the second conductive pads; and

passing the first and second signaling thru-holes through the additional conductive pads that are in respective alignment with those thru-holes.

20. The method of claim 19, wherein the planes selected for placing conductive pads are identical for the first and second thru-holes.

21. An electrical router backplane comprising:

multiple high-speed signaling layers, each high-speed signaling layer comprising a plurality of high-speed differential trace pairs with an individual trace width of approximately 7 to 9 mils and a differential trace spacing of 15 to 20 mils, sandwiched between layers of a dielectric material, each trace having a conductive pad at each end;

a plurality of ground planes, including ground planes interposed respectively between the high-speed signaling layers, the trace-to-ground-plane spacing related to the differential trace spacing and the individual trace width such that the impedance of individual high-speed differential traces is marginally more differential than single-ended;

a plurality of signaling thru-holes, each having a conductive liner electrically connected to and passing through a conductive pad at one end of a high-speed differential trace, respectively; and

conductive pads at the respective locations of the signaling thru-holes on a plural subset of the ground planes, each separated by a clearance from the remainder of the ground plane they reside on, the signaling thru-holes electrically connected to and passing through the conductive pads at their respective locations.

22. The router backplane of claim 21, wherein the plural subset of the ground planes are approximately evenly spaced within the backplane, depth-wise.